

Appendix A

Methods for identifying, mapping and analyzing landscape classes

Estuaries, bays, beaches and marine waters are the four broad landscape classes described in this chapter. Further refinement of some of these classes reflects the current wisdom of how various geomorphological and oceanographic processes act on the various salmon life histories. “Pocket estuaries” for example are a subset of the estuary class that seems to have relevance to certain life history stages of salmon. We understand beaches to be largely controlled by sediment transport processes that operate as littoral drift cells. Bays and marine waters were not specifically mapped comprehensively but they serve either as the matrix within which these smaller components reside or in the case of some bays, have unique oceanographic conditions that may affect salmon.

Estuaries

River mouth estuaries were delineated based on the occurrence of the 22 independent populations of Chinook salmon spread across the Puget Sound landscape. The 22 populations emanate from drainages emptying into certain river mouth estuaries, or the 11 main natal deltas we specifically highlight. Thus, 11 natal estuaries are identified on Puget Sound region maps throughout the chapter.

Methods

Delineating the physical boundaries of the 11 natal deltas was the first step in the mapping procedure. The physical boundaries are:

1. Seaward edge
2. Shoreward edge
3. Alongshore end point 1
4. Alongshore end point 2

The Department of Natural Resources’ Shorezone data set provided the platform for which to identify and delineate these boundaries. The seaward boundary was delineated by using the –20 meter MLLW line in the nearshore (also the outer seaward definition of the nearshore region), as this region of depth is associated with the limit of the photic zone. The landward boundary was approximated as the landward region of tidal influence. Finally, the alongshore boundaries (upper and lower) were delineated by selecting a Shorezone data point at two locations, each signifying the approximate terminus of the natal delta in each direction (PSAT staff applied best professional judgment for the alongshore boundary locations). At this point it was possible to calculate the area within the newly formed polygon, plot the area on a map, and generate a variety of statistical information. See Figure 2-3 for an example of the 11 natal deltas (dark-colored regions at river mouths).

Bay

Bays are generally semi-enclosed portions of the larger marine waters matrix that are influenced by the land and/or freshwater and sediment sources flowing into them. Most maps contain

numerous named bays, which may or may not have a specific influence on salmon. In many cases, bays are transitional between the delta or pocket estuary where critical salmon functions occur and the larger migratory corridor through Puget Sound and to the Pacific Ocean. Where bays have lowered salinities or shallow depth, they may be extensions of the refuge and physiological transition functions provided by deltas and pocket estuaries.

Methods

Since bays were not specifically mapped for this project, certain bays that have unique characteristics affecting salmon are mentioned by name in the sub-basin analyses. The boundaries of a bay are not well established as a mapping convention and there are few common features of all bays.

Beaches

Puget Sound beaches are described by geologists as receiving their primary sediment source from eroding bluffs and only secondarily from inland sediment sources like rivers or streams. Nonetheless, with 10,000 or so streams and rivers intersecting the marine shoreline, the influence of those sediments and flows in shaping Puget Sound beaches cannot be underestimated.

Methods

Washington Department of Ecology produced several useful data layers and web based products to aid in the identification of and description of Puget Sound beaches. The Digital Coastal Atlas allows viewing of littoral drift cells, oblique aerial photos, armoring approximations by Shorezone and other features in an interactive map. Special GIS products with drift cells, armoring and digital elevation features were compared with aerial oblique photo images to produce sub-basin maps that describe large sections of Puget Sound's beaches.

Marine Waters

As mentioned above, the marine waters of Puget Sound are the larger matrix within which these other landscape classes and components are arranged. There are widely variable oceanographic parameters within each sub-basin of Puget Sound that depend on their distance from the Pacific Ocean, the interactions of those waters with geologic features, human influences and the salmon populations themselves

Methods

Characteristics of marine waters are described within the context of each sub-basin and calculated as an aerial extent subtracting the other "nearshore" features. In this way, the relative area of nearshore Vs. offshore waters can be used to further describe the nature of each sub-basin and the amount of influence the Pacific Ocean or the land and waters of the Puget Sound basin may have on them.